FIG. 1.

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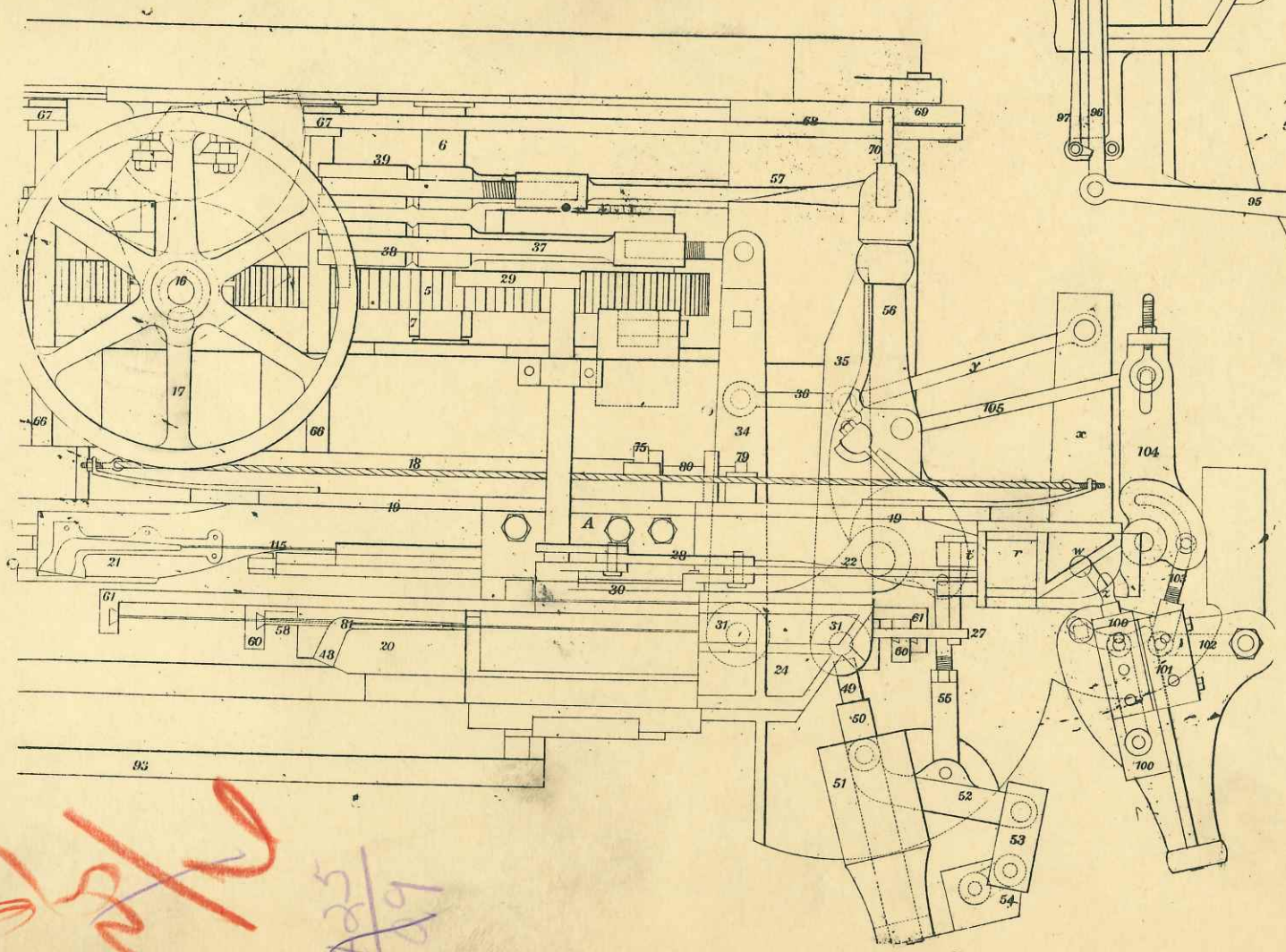

FIG. 4.

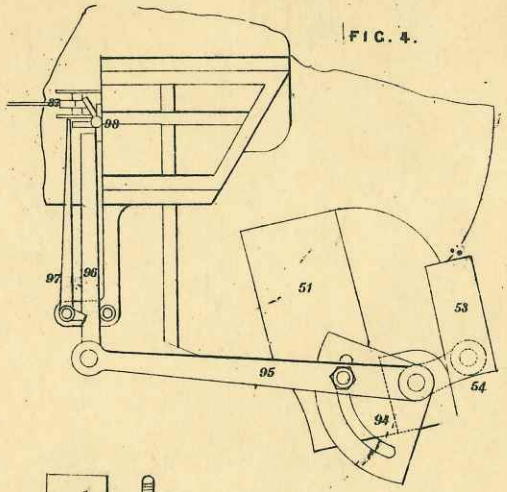

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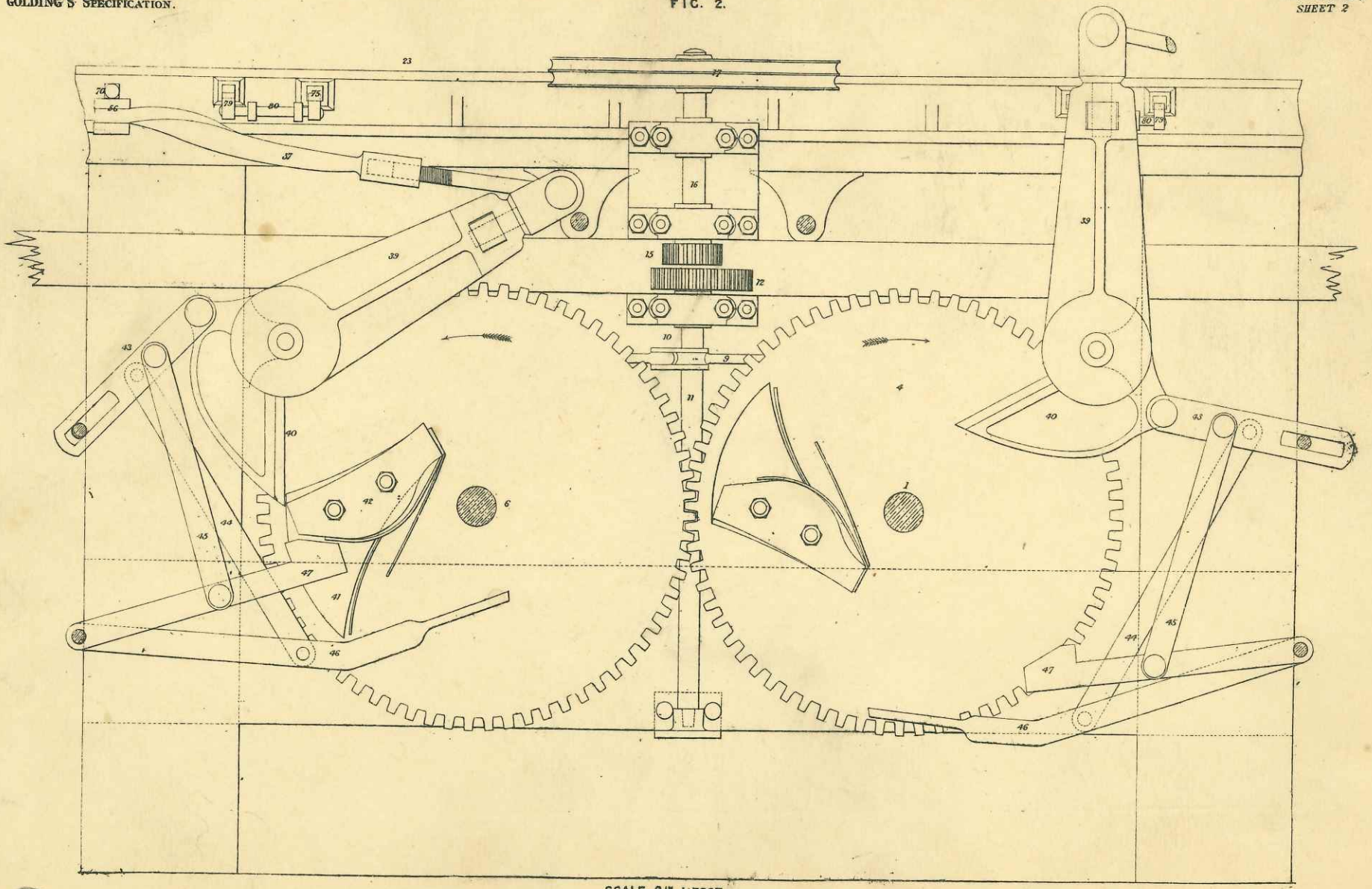
FIG. 2.



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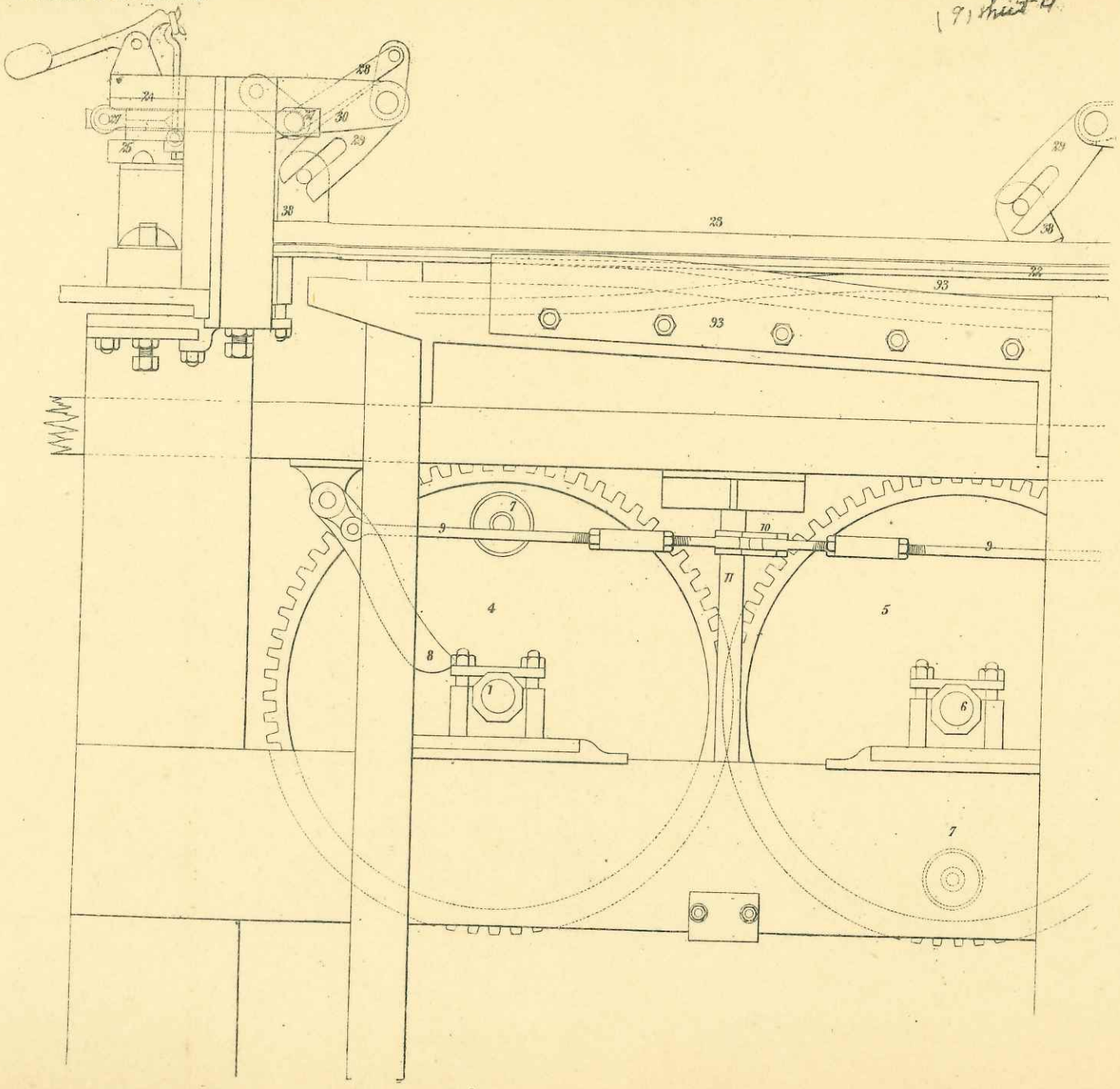
GOLDING'S SPECIFICATION.

FIG. 3.

(9) Sheet 4



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87. JOTTS PATENT GLUE.
Candle-Apparatus.

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FIG. 5.

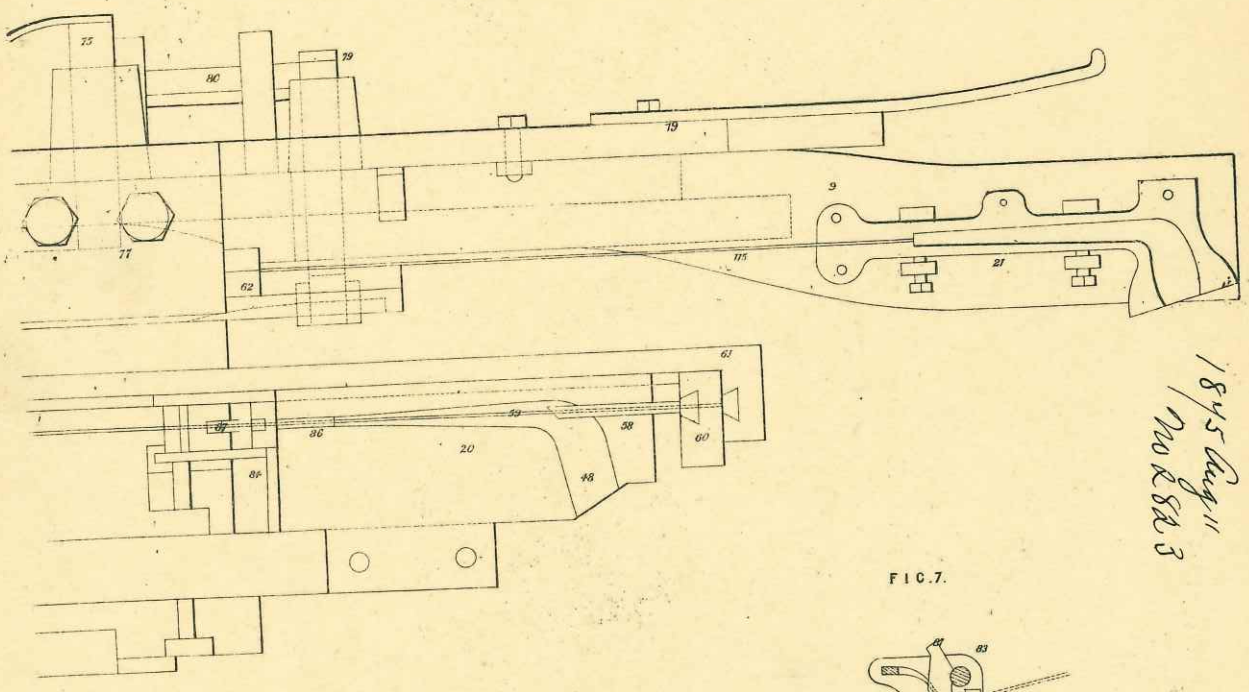

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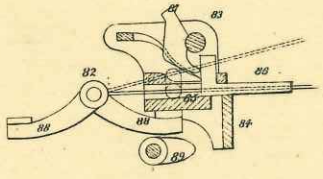
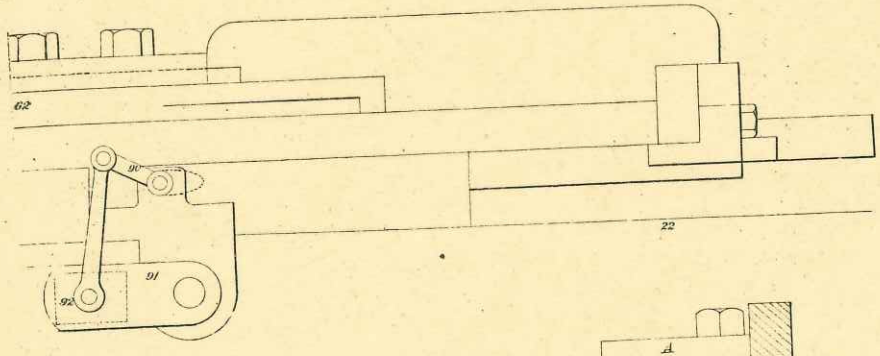
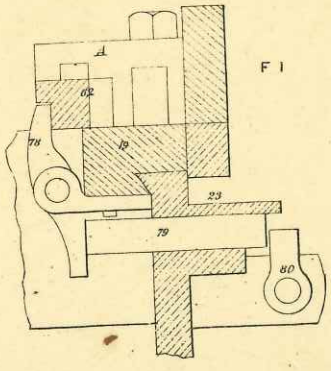
FIG. 7.







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87. OIL, FAT AND GLUE
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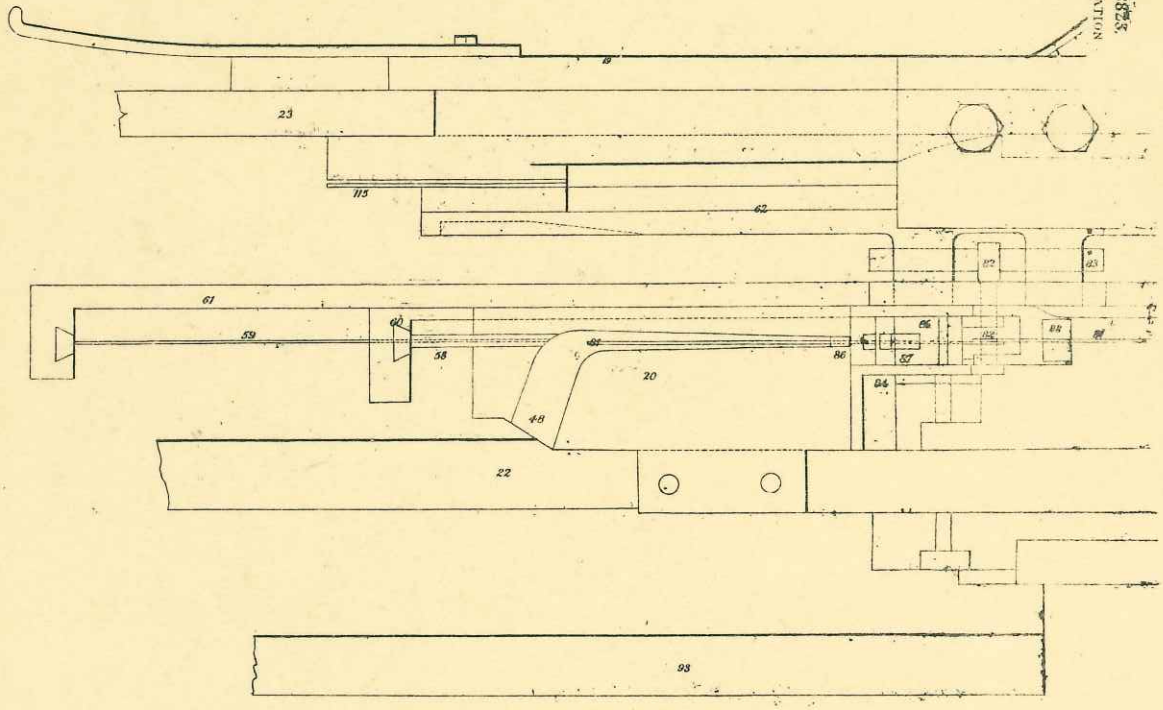
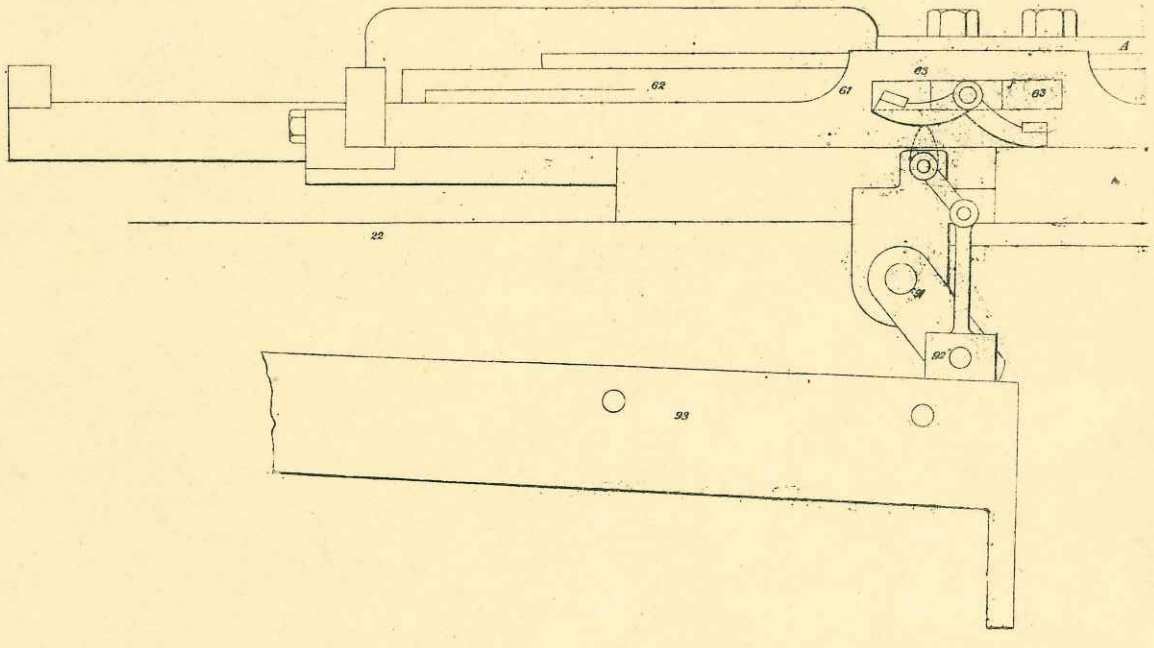


FIG. 1



87. OIL, FAT AND GLUE.
Candle Apparatus.

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FIG. 11.

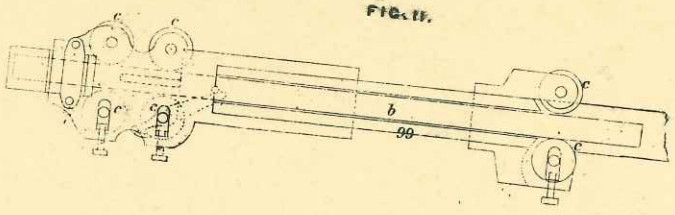

FIG. 13.

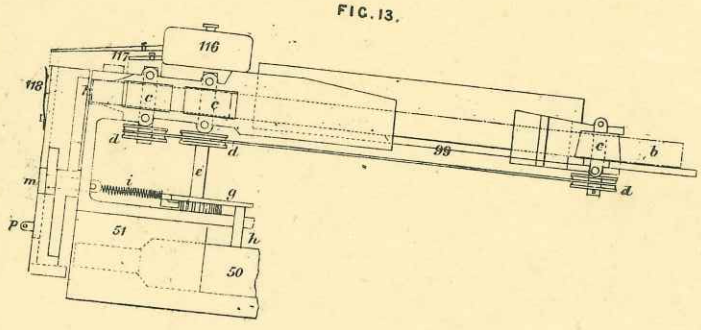

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FIG. 14.

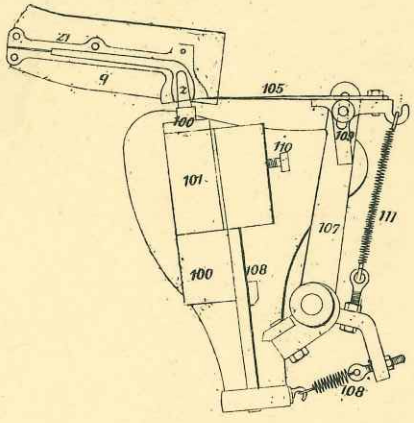
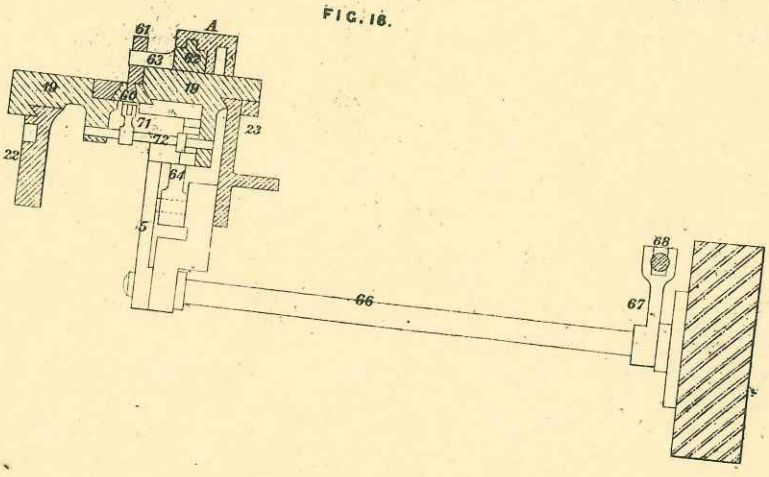


FIG. 16.



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87. OILS, FATS AND GLUE.
Candle Apparatus.

FIG. 9.

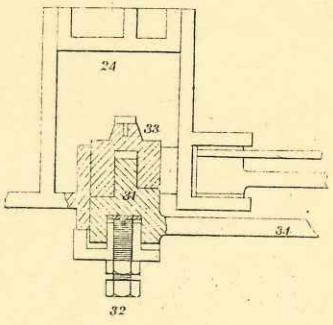


FIG. 10.

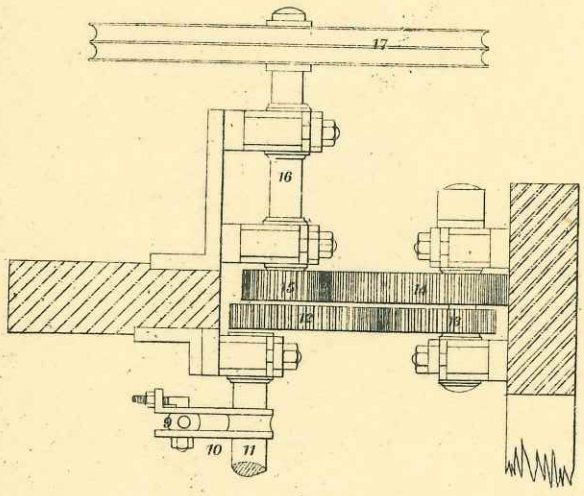


FIG. 12.

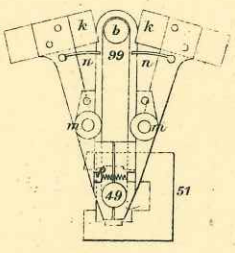
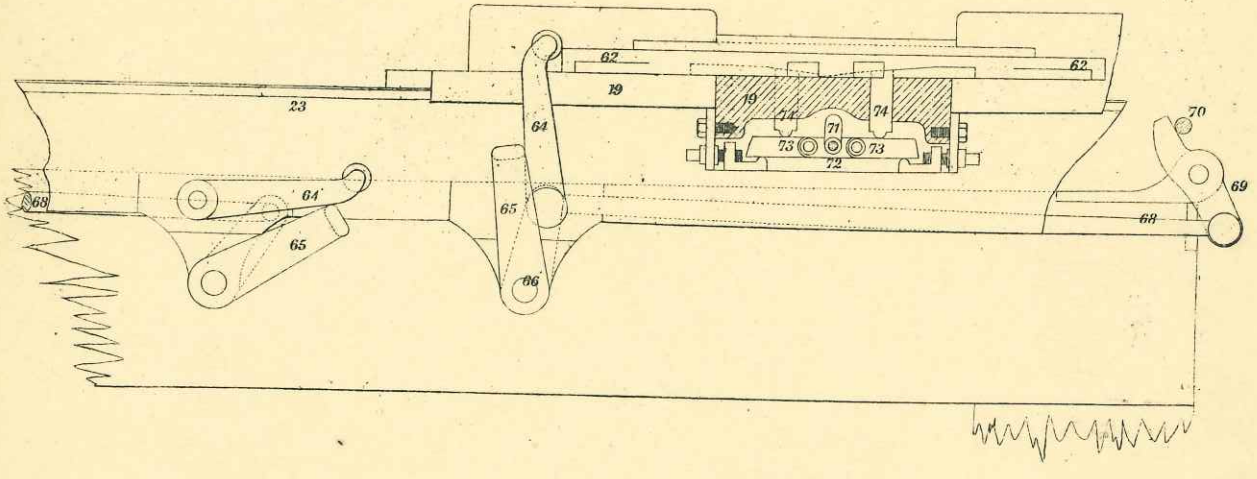


FIG. 15.



into the bowl as the stapper is being withdrawn to insure an opening into the bowl.

When moulding the pipe entirely in the first mould the piston or plunger is formed with a stapper-shaped front, or a stapper is forced through the piston (made annular) after the piston is forced in a certain distance, or the piston may be withdrawn and a stapper be forced into the same mould afterwards, whilst a part of the mould with the cylindrical portion of the bowl part may be separable to facilitate the secondary introduction of the stapper. It is however preferred to shape the pipe at two operations in different moulds, unless the bowl part is of a very plain form.

SPECIFICATION in pursuance of the conditions of the Letters Patent, filed by the said Richard Golding in the Great Seal Patent Office on the 10th February 1876.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, RICHARD GOLDING, of Tooting, in the County of Surrey, Tobacco Pipe Maker, send greeting.

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Eleventh day of August, in the year of our Lord One thousand eight hundred and seventy-five, in the thirty-ninth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto me, the said Richard Golding, Her special licence that I, the said Richard Golding, my executors, administrators, and assigns, or such others as I, the said Richard Golding, my executors, administrators, and assigns, should at any time agree with, and no others, from time to time and at all times thereafter during the term therein expressed, should and lawfully might make, use, exercise, and vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for "IMPROVEMENTS IN MAKING CLAY TOBACCO PIPES AND IN APPARATUS THEREFOR," upon the condition (amongst others) that I, the said Richard Golding, my executors or administrators, by an instrument in writing under my, or their, or one of their hands and seals, should particularly describe and ascertain the nature of the said Invention and in what manner the same was

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to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the date of the said Letters Patent.

NOW KNOW YE, that I, the said Richard Golding, do hereby declare the nature of my said Invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement in writing, reference being had to the accompanying Drawings, that is to say :—

My said Invention has for its object the making of clay tobacco pipes in a better and more economical manner than has hitherto been attained.

In carrying out my Invention according to one modification a "roll" or rough pipe block is first formed in one mould or pair of half moulds and is afterwards transferred to and finished in a second mould; in another modification, however, the moulding may be all performed in one mould. An important feature of my Invention is the adaptation of the apparatus for using clay of extreme stiffness, and thereby producing pipes of great strength.

The clay carefully prepared in any suitable known way is first formed into bars of any convenient shape by being forced through die orifices out of a cylinder by means of a piston or plunger worked by a screw or by hydraulic power. Short lengths or blocks are cut off the clay bar in succession, and each block is forced into the "roll" mould by a piston or plunger moved so as to exert very great pressure on the clay. The pressure of the plunger on the clay in the bowl part of the mould causes the clay to fill into the stem part, where it is at once moulded in a tubular form in consequence of a wire being held in the mould at the time. The same wire, or a second wire substituted for it at the end of the forcing operation, is made to turn the roll up out of the mould in a manner facilitating its transference to the second or finishing mould. The apparatus is contrived so that the various movements of its parts are derived from a first motion revolving shaft through suitable gearing operating by cams or wipers on levers and other parts.

And in order that my said Invention, and the manner of performing the same may be properly understood, I hereunto append five Sheets of explanatory Drawings, to be herein-after referred to, and representing one modification of my improved tobacco pipe moulding apparatus. In

these Drawings the same reference numerals and letters are used to mark the same or like parts wherever they are repeated.

Figure 1 on Sheet 1 of the Drawings is a plan of the machine, but with various parts removed partly to avoid repition and partly to facilitate the explanation of parts which could not be properly shown otherwise.

Figure 2, Sheet 2, is a back elevation, and Figure 3, Sheet 3, is a front elevation, both as with parts removed.

Sheet 4 comprises enlarged views of the slide or carriage, and other parts, and Sheet 5 comprises separate views of various details. The first motion shaft 1 of the machine is a horizontal shaft having loose on it a spur wheel 2 to be driven by a pinion on the crank shaft of a steam engine or on a shaft driven in any other convenient way, and a clutch and lever 3 are provided for engaging the spur wheel 2 with the shaft 1. The shaft 1 is carried in bearings in the framing of the machine, and has fast on it a spur toothed wiper disc 4 which gears with a similar spur toothed wiper disc 5 on a parallel horizontal shaft 6. Most of the parts of the machine are in duplicate and symmetrically placed towards either end; the various actions take place alternately, however, there being at each side apparatus for forming a roll and apparatus for the second or finishing moulding operation whilst all four moulds are on one slide, which moves alternately towards each end of the machine. The movements of the mould slide are derived from wiper studs 7 on the inner or front faces of the discs 4, 5, which studs act on levers 8 centered on brackets fixed to the framing. The levers 7 are connected by adjustable links 9 to a short lever or boss 10 on a vertical shaft 11, and this shaft, by means of gearing shown separately in Figure 10, Sheet 5, and consisting of toothed sectors 12, 13, 14, 15, gives increased motions to a vertical shaft 16, having fast on it a grooved pulley 16, which is connected by cords 18 (Figure 1) to the mould slide 19.

The mould slide 19 is shown separately in plan and front elevation in Figures 5 and 6, Sheet 4, besides being partly shown in Figure 1. In Figure 6 the bottom half of each roll mould 21 and the bottom half of one of the finishing moulds 21 are shown in the positions in which they are held on the slide, being however free to move vertically to a slight extent for a purpose herein-after referred to. The mould slide 18 rests

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and moves on two parallel horizontal guide rails 22, 23, formed on or fixed to the framing; and when the slide is in the position in which it is shown in Figure 1 the forcing or compressing actions are just being completed in the moulds 20, 21, at the right hand end, whilst at the left hand end a completely moulded pipe has been removed from the finishing mould 21, to which a roll has afterwards been transferred from the roll mould 20. The mould slide 19 in moving to the right carries its right hand half roll mould 20 into a box 24 (shown in vertical section in Figure 3, Sheet 3) and under the upper half mould 25, which is at the time held up by a counterweighted lever 26 connected to it by links. As soon as the lower half mould 20 has entered the box 24 the upper half mould 25 is closed down upon it by the action of a wedge bar 27, which is then moved to the right. This bar 27 is made with two blocks, formed at their right hand corners with inclines, which acting on counterpart inclines on the under side of the cover of the box 24, and on the top of the upper half mould 25, first cause the depression of the latter, and then parallel parts of the blocks entering between corresponding parts of the cover and half mould form a solid combination capable of resisting a strong pressure that is immediately afterwards applied for the purpose of gripping the two half moulds 20, 25, forcibly together. The bar 27 is moved by a toggle link 28 jointed to the short arm of a two armed lever 29 carried by a bracket 30 attached to the box 24, the lever 29 being actuated as herein-after explained. The end of the toggle link 28 that is connected to the wedge bar 27 is guided by a short radius link. The details acting on the wedge bar 27 are partly indicated by dotted lines in Figure 3. The half moulds 20, 25, are gripped together by two short vertical screws 31, indicated by dotted lines in Figure 3. The half moulds 20, 25, are gripped together by two short vertical screws 31, indicated by dotted lines in Figures 1 and 3, and shown in a separate sectional view in Figure 9 (Sheet 5). Each screw 31, or circular wedge as it may be more appropriately termed in this application, is set in a socket formed for it in the bottom of the box 24, being held up by a plate bolted on and having in it a screw and jam nut 32 for nicely adjusting the position vertically of the circular wedge 31. A block 33 movable vertically, but which does not turn, rests on the wedge or screw 31, its under side being made counterpart to it; and a steel pin is fixed in the top of this block 33 to bear up against the half mould 20. The wedges or screws 31 are formed with lever arms 34, 35, connected

by a link 36, and one arm 34 has attached to it by a swivel joint a link 37 connecting it to a lever 38, which in Figure 2 is exactly behind a similar lever 39, the function of which last is herein-after explained. The levers 38, 39, are centered on brackets fixed to the framing, and are formed with wings 40 to be acted on by wiper blocks 41, 42, on the disc 4 or 5, each lever 38 being acted on by the block 41, which is fitted with a spring blade at the part first coming into action to moderate the concussion. Slotted links 43 guided on a fixed pin are jointed to the levers 38, 39, and are connected by links 44, 45, to levers 46, 47, which are acted on by the wiper blocks 41, 42, so as at the proper times to move back the levers 38, 39, and parts connected to them. The powerful action of the screws or wedges 31 grips the two half moulds 20, 25, so forcibly together that the mould can withstand the pressure with which the clay is forced in as though consisting of a single solid piece.

Before describing the arrangements for placing the blocks of clay successively into position for being forced into the mould it will be most convenient to describe the parts for forcing in the clay, premising merely that each block of clay is at the proper time placed in front of the bowl orifice 48 of the mould. The block of clay is forced into the mould 20, 25, by a piston or plunger 49 formed or fixed on the end of a block 50, which is fitted to slide in a guide box 51 fixed on the framing. The piston block 50 is moved by a bar or lever 52 jointed to it by a pin and connected to a bar 53 centered on a short lever 54 indicated by dotted lines in Figure 1. The bar 52 directly connected to the piston block 50 is connected by an adjustable link 55 to a lever 56 centered on the framing so as to move horizontally, and this lever 56 has attached to it by a swivel joint an adjustable link 57 which connects it to one 39 of the levers acted on by the wipers on the disc 4 or 5. At the time that the clay is being forced into the mould 20, 25, there are in the mould, as shown at the right-hand side of Figure 5, a tubular plug 58 and a wire 59, the latter passing through the former and each attached to a dovetail piece which is movable vertically the one in the plug holder 60, and the other in the wire holder 62. These parts are made movable vertically, as is also the half mould 20 itself on pins which keep it horizontally in place on the mould slide 20 in order to allow of any upward movement which the gripping screws 31 may cause. The wire holder 61 is a long bar movable longitudinally on the mould slide 19, and carrying a wire 59 at each right angled end. It moves partly with the mould slide and is partly moved thereon by a

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bar 62 formed with two projections 63 entering a slot in it. The bar 62 is itself moved by details, best seen in Figures 15 and 16, Sheet 5, the latter being a vertical section as at right angles to the former. A lever 64 centered on the framing is turned up after the mould slide 19 has passed over it, and is made to move the bar further in the same direction by a lever 65 on the end of a horizontal shaft 66, having fast on its other end a lever 67 connected by a link to another lever 69, so centered on the framing as to be encountered by a pin 70 on the end of the lever 56, herein-before referred to. Each wire 59 is entered from the bowl end towards the end of the pipe stem in order that the clay in being forced through the mould may exert a pulling instead of a pushing action on it, and it is protected against the thrust of the clay in the bowl part by the tubular plug 58. The wire 59 is withdrawn before the forcing action of the piston 49 is quite completed, and the tubular plug 58 is also withdrawn so far as to make its inner end flush with the side of the bowl part, and the continuance of the forcing movement causes the clay to completely fill the cavity that would otherwise be left by the plug. The plug holder 60 is a dovetail bar with right angled ends, and is fitted partly beneath the wire holder 61 in a guide groove in the mould slide 19. It is moved by a lever 71 on a small rocking shaft 72 carried by the mould slide, and this shaft 72 has fast on it two jointed levers 73 which are acted on alternately by struts 74 moved in vertical slots in the mould slide 19 by inclines formed on the under side of the bar 62, which is herein-before referred to as moving the wire holder 61. The action of the jointed levers 73 can be varied by adjusting small blocks on which their outer ends rest. The bar 62 also serves for relieving the mould slide 19 from one of two locking catches 75, which secures it whilst the moulding operation is being performed at either end of the machine. This catch 75 is a bolt pressed by a spring 76 through a slot in the framing, so as after being pushed out by an inclined projection on the mould slide and indicated by dotted lines at 77 in Figure 5 to enter behind such projection. An incline near each end of the bar 62 acts on a lever 78, best seen in the section Figure 8, and centered on the framing, and this lever 78 moves a bolt 79 so as to turn a small rocking spindle 80, that by a wiper or small lever acting against a projection on the under side of the bolt 75, but not shown in Figure 8, moves that bolt outwards and thereby allows the mould slide to be moved towards the other end of the machine. The bar 62 is held in place by a grooved cover A bolted to the mould slide 19.

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As the wire 59 is being withdrawn from the mould 20, 25, it is followed by another wire 81 which enters at the stem end, being held by a spindle 82 which moves for the most part with the wire holder 61 so as to closely follow the first wire 59 along the stem; but it stops short on reaching the bowl because of a bar 83 fixed to it encountering the box 24 in which the roll moulding operation takes place. The half mould 20 has bolted to its inner end a small casting 84, shown separately in Figure 7 and formed with two cheeks, between which there is a small cradle 85 formed with trunnions entered into slots in the cheeks. In the cradle 85 there is fitted to slide a small tube 86 through which the wire 81 passes, and which is entered into the stem orifice of the mould 20, 25. The clay on being forced into the mould ultimately reaches the tube 86, and if there is any surplus of clay it forces the tube out so that a lug on it encounters and turns a trigger 87 which prevents further pressure on the clay in a manner herein-after explained. When the half mould 20 is moved to the middle of the machine the cradle 85 gets upon one of a pair of pieces 88 jointed loosely on the spindle 82, on which the wire 81 is centered, and the piece 88 is then lifted by a cam 89, and causes the wire 81 to be turned up with the roll on it into an inclined position clear of the mould, so that the roll can be easily drawn by hand off the wire 81, and be transferred to the finishing half mould 21. The slots in the cheeks of the casting 84 allow the cradle 85 to turn up, as described. The cams 89 are moved by dovetails, partly shown in Figure 6, a lever 90 on the small shaft of each cam being connected by a link to another lever 91, on which there is jointed a block 92 fitted to run in a guide groove. The two guide grooves are in fixed parts 93 of the framing, and are inclined so as to cause the desired movements of the cams 89 as the mould slide 19 moves from end to end. The parts acted on by the trigger 87 (Figure 7) are shown in Figure 4. The lever 54 which carries the ordinarily stationary centre for the parts acting on the piston block 50 is itself centered on a fixed part, and has attached to it a quadrant 94 on which there is adjusted and fixed a lever 95, having jointed to its end a rod 96. This rod 96 is formed with a notch so as to be held between a fixed stud on a bracket and a projection forming the shorter arm of a bell-crank lever 97, also centered on the bracket. The end of the longer arm of the lever 97 is held out by a strut forming one arm of a small bell-crank lever 98, and it is on the other arm of this lever 98 that the trigger 87 acts, so that when there is a surplus of clay in the mould it causes the lever 98

to turn and release the bell-crank lever 97, whereupon the rod 96 and lever 95 become free, and any further strain moves out the lever 54 instead of forcing the piston 49 further into the mould.

The mechanism for supplying the clay blocks for the roll mould 20, 25, is shown on Sheet 5, Figure 11 being a plan, Figure 12 an inner end elevation, and Figure 13 a side elevation. This mechanism is to be placed upon the guide box 51 of the piston block 50, and it comprises a horizontal guide 99, on which there is placed a round bar *b* of the clay, shown by blue lines, such bar being formed of a sufficiently stiff consistency in the manner herein-before described. The bar *b* is moved towards the mould, that is, to the left hand, as shown in Figures 11, 13, but at a higher level by rollers *c*, which are on spindles having pulleys *d* on them with cords passed round to cause them all to move together. The spindle *e* of one of the pulleys *c* extends down to a ratchet wheel *f*, which is acted on by a pawl and lever *g*; this lever being moved to the right by a pin *h* fixed in the piston block 50, and projecting up through a slot in the top of the guide box 51. The piston block acts on the pawl lever *g* during the latter half of its traverse from the mould, and during the first half of its return the pawl lever *g* is moved to the left by a spring *i*, and it is then that the pulleys *c* are turned so as to feed the clay bar *b* forward to the extent required for a block. When the bar *b* is thus fed forward its end projects over the end of the bottom of the guide 99, and over the inner end of the guide box 51, and a length or block is then cut off it by a pair of knives *k* held by levers turning on centres *m* and moved by the wedgewise entrance between the lower ends of the levers of the piston block 50, this action taking place during the second half of the movement of the piston block towards the mould. The block then cut off is supported by blades *n* fixed to the knife levers until the piston block 50 moves back again, when the upper end of the knife levers open by the action of the spring *p* on their lower ends, and the clay block then drops down between guides so as to be in front of the piston 49, when the piston block 50 next moves towards the mould.

The second or finishing moulding operation is effected on one pipe at the same time that the roll for another one is being formed. The under half finishing mould 21 is clamped on a plate *q* fitted upon the mould slide 19 so as to be slightly movable vertically, and as the slide 19 moves to the right it is carried into a box *r*, in which the upper half mould *s*

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is closed down upon it by means of a wedge bar *t* connected to the wedge bar 27, herein-before described, together with its actuating details, in connection with the roll mould 20, 25. The toggle link 28 has jointed to it a horizontal link *u*, and one pin connects the outer end of this link to both wedge bars 27, *t*. The lever 29, by means of which the wedge bars 27, *t*, are moved, is acted on by a pin on the lever 38, and is fast on the back end of a horizontal shaft, which has on its front end the short lever jointed to the toggle link 28. The two half moulds 21, *s*, are next gripped together by a vertical screw or wedge *w* turned by a lever *x* connected by a link *y* to one, 35, of the levers of the gripping screws 31 for the roll mould. The piston or "stapper" *z* which forms the bowl of the pipe and at the same time forces the clay into all parts of the mould 21, *s*, is attached to a block 100, which slides in a guide box 101, and is connected by a link to a lever 102, indicated by dotted lines in Figure 1, and which is itself connected by an adjustable link 103 to a second lever 104, connected by a link 105 to the corresponding lever 56 of the roll moulding movements. After the stapper *z* is withdrawn any surplus clay at the bowl orifice of the mould 21, *s*, is cut off by a knife 106, shown with other details in Figure 14, Sheet 5, and carried by a lever 107, which is acted on by a tappet 108 on the stapper slide 100. The knife is fixed to a bell crank 109 jointed to the end of the lever 107, and as this lever is moved to the left the bell crank 109 encounters a screw 110, and is thereby made to fling off any clay it may have cut off. The bell crank 109 and knife 106 are turned back again by a spring 111. The lever 107 is moved back by a spring 108.

When the roll has been laid in the finishing mould 21 a wire 115 is entered up its already hollowed stem, and after the second operation is completed and the mould moved back to the middle of the machine the finished pipe may be tilted up by the wire in the manner herein-before described with reference to the roll. In the Drawings, however, (Figure 5) the wire 115 is supposed to be attached to the bar 62 herein-before described for moving the wire holder 61.

In herein-before describing the arrangements for cutting short blocks off the clay rod *b* it should have been mentioned that the clay is supplied with a little oil to prevent its adherence to the moulds, the oil dripping from a reservoir 116 by two tubes 117, fitted with regulating

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cocks, and one of which drops the oil on a small sponge held by a spring 118 against the end of the block that is being cut off.

The apparatus shown on the Drawings is contrived so that the moulds 20, 25, and 21, *s*, can be changed for other moulds adapted for pipes differing to a limited extent in shape, and in particular the necessary parts can be adjusted to suit different inclinations of the bowl part to the stem. Thus the guide box 51 for the piston block 50 appertaining to the roll mould is upon an arc-shaped piece of the fixed framing, on which piece it can be bolted in any desired position, and the levers and links through which the movements of the piston block 50 are effected are made adjustable to suit any position, the centres of the levers being chosen so that the action may not be affected by any required change of position. In a similar way the slide block 100 of the stapper *z* appertaining to the finishing mould works on a plate, which can be fixed at different parts of an arc-shaped part of the framing, and the levers and links for working the slide block 100 are also made correspondingly adjustable.

The bowl part of the roll mould 20, 25, is shaped as plainly as possible, and a considerable part of it from the mouth 48 inwards is made truly cylindrical (or it might be prismatic), so that the plunger 49 works in it like a close fitting piston in a cylinder.

When moulding the pipe entirely in the first mould 20, 25, the piston or plunger 49 is formed with a stapper-shaped front, or a stapper is forced through the piston (made annular) after the piston is forced in a certain distance, or the piston may be withdrawn and a stapper be forced into the same mould afterwards, whilst a part of the mould with the cylindrical portion of the bowl part may be separable to facilitate the secondary introduction of the stapper. I, however, prefer to shape or mould the pipe at two operations in different moulds unless the bowl part is of a very plain form.

Having thus particularly described my said Invention and the manner of performing the same, I have to state that I do not restrict myself to the precise details herein described or delineated, and that I do not claim to have invented every separate detail or minor arrangement that I have had occasion to refer to, as some of such details are necessarily common to any tobacco pipe making apparatus, but that what I believe

to be novel and original and claim as the Invention secured to me by the herein-before in part recited Letters Patent is,—

1. The making of "rolls" for forming clay tobacco pipes out of blocks cut from a bar or rod of stiff clay by means of a pair of half moulds (20, 25,) shaped as regards the bowl part, and placed, and gripped, and having working in combination therewith a close fitting piston (49), all in the manner herein-before described.

2. The forming of the tubular stem of the roll on a wire introduced from the bowl end, and having combined with it a projecting plug piece, such wire and plug piece being withdrawn and a second wire entered from the stem end and made to tilt up the roll, all as and for the purposes herein-before described.

3. The combining of each roll mould with its companion finishing mould and the several accessories in the manner herein-before described.

4. The herein-before described arrangements for separating or closing each upper half mould from or upon its under half mould and for moving the latter horizontally away from the former.

5. The arranging and combining of the parts for working the piston (49) and stapper (*z*) and the providing for the adjustment of those parts to suit different inclinations of the bowl, in the manner herein-before described.

In witness whereof, I, the said Richard Golding, have hereunto set my hand and seal, this Ninth day of February, in the year of our Lord One thousand eight hundred and seventy-six.

RICH^{D}. GOLDING. (L.S.)

Witness,

EDMUND HUNT,
Patent Agent,
Glasgow.

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